

Facility Name: **Effingham Energy Facility**

City: Rincon

County: Effingham

AIRS #: 04-13-10300012

Application #: TV-668257

Date SIP Application Received: July 1, 2022

Date Title V Application Received: July 1, 2022

Permit No: 4911-103-0012-V-06-1

<b>Program</b>	<b>Review Engineers</b>	<b>Review Managers</b>
<b>SSPP</b>	Renee Browne	Cynthia Dorrough
<b>SSCP</b>	Nikolai Thome	Tammy Martiny
<b>ISMU</b>	Marcus Cureton	Dan McCain
<b>TOXICS</b>	N/A	N/A
<b>Permitting Program Manager</b>		Stephen Damaske

## Introduction

This narrative is being provided to assist the reader in understanding the content of the referenced SIP permit to construct and draft operating permit amendment. Complex issues and unusual items are explained in simpler terms and/or greater detail than is sometimes possible in the actual permit. This permit is being issued pursuant to: (1) Sections 391-3-1-.03(1) and 391-3-1-.03(10) of the Georgia Rules for Air Quality Control, (2) Part 70 of Chapter I of Title 40 of the Code of Federal Regulations, and (3) Title V of the Clean Air Act Amendments of 1990. The following narrative is designed to accompany the draft permit and is presented in the same general order as the permit. This narrative is intended only as an adjunct for the reviewer and has no legal standing. Any revisions made to the permit in response to comments received during the public comment period and EPA review process will be described in an addendum to this narrative.

**I. Facility Description****A. Existing Permits**

Table 1 below lists the current Title V permit, and all administrative amendments, minor and significant modifications to that permit, and 502(b)(10) attachments.

**Table 1: Current Title V Permit and Amendments**

Permit/Amendment Number	Date of Issuance	Description
4911-103-0012-V-06-0	Draft Permit	Title V Renewal

**B. Regulatory Status****1. PSD/NSR/RACT**

The facility is a major source under PSD regulations because it has the potential emissions of NO<sub>x</sub>, CO, and particulate matter greater than 100 tons per year (it is one of the 28 named source categories).<sup>1</sup> The facility was originally permitted in 2001 and was permitted as a major source under the PSD regulations.

**2. Title V Major Source Status by Pollutant****Table 2: Title V Major Source Status by Pollutant**

Pollutant	Is the Pollutant Emitted?	If emitted, what is the facility's Title V status for the Pollutant?		
		Major Source Status	Major Source Requesting SM Status	Non-Major Source Status
PM	Y	✓		
PM <sub>10</sub>	Y	✓		
PM <sub>2.5</sub>	Y	✓		
SO <sub>2</sub>	Y			✓
VOC	Y			✓
NO <sub>x</sub>	Y	✓		
CO	Y	✓		
TRS	N			
H <sub>2</sub> S	N			
Individual HAP	Y			✓
Total HAPs	Y			✓

<sup>1</sup> Lillis, Edward J., Memorandum on *Determining Prevention of Significant Deterioration (PSD) Applicability Thresholds for Gas Turbine Based Facilities*, February 2, 1993, <http://www.epa.gov/ttn/nsr/gen/turbines.pdf>.

## **II. Proposed Modification**

### **A. Description of Modification**

OPC (Oglethorpe Power Corporation) is proposing the CT (combustion turbine) Upgrades Project involving modifications to the facility's combustion turbines. The project would result in increases in maximum heat input and maximum projected annual air emissions.

The proposed CT Upgrades Project would involve the implementation of two upgrades for OPC Effingham's two combustion turbines: the Advanced Gas Path (AGP) Upgrade and the Low Load Turndown (LLTD) Upgrade.

The AGP would improve facility electrical output and efficiency, as well as extend the maintenance interval of the units by replacing existing gas turbine hardware with hardware using improved designs and materials and modifying site-specific control logic.

New turbine hardware would include gas turbine buckets, diaphragm nozzles, and shroud blocks. These changes would increase the capacity of the facility by approximately 23 MW, with variations for ambient temperatures. The increased capacity would decrease the cost of electricity generation.

The LLTD upgrade would involve the installation of new combustion turbine components and software controls to replace selected equipment and connected accessories to allow for sustained operations at lower operating loads during periods of low demand.

These changes would include the combustion chamber upgrades and modifications to associated cooling equipment, along with site-specific control logic optimizations. Currently, the facility shuts down periodically during low demand and then restarts when demand increases. The LLTD upgrades would allow the combustion turbines to operate at steady-state minimum loads between approximately 45 to 50 MW, with variations for ambient temperatures, while continuing to maintain emission concentrations of NO<sub>x</sub> and CO in compliance with the facility's permitted emission limits. As a result, this upgrade would allow the facility to continue to operate with less frequent shutdowns during low demand periods, thereby reducing maintenance and fuel costs associated with cycling through shutdowns and startups.

## B. Emissions Change

**Table 3: Emissions Change Due to Modification**

<b>Pollutant</b>	<b>Is the Pollutant Emitted?</b>	<b>Net Actual Emissions Increase (Decrease) (tpy)</b>	<b>Net Potential Emissions Increase (Decrease) (tpy)</b>
PM	✓	+10.3	+10.3
PM <sub>10</sub>	✓	+10.1	+10.1
PM <sub>2.5</sub>	✓	+9.5	+9.5
SO <sub>2</sub>	✓	+1.14	+1.14
VOC	✓	+3.80	+3.80
NO <sub>x</sub>	✓	+37	+37
CO	✓	0	0
TRS	N/A		
H <sub>2</sub> S	N/A		
Individual HAP (Toluene)	✓	+0.63	+0.63
Total HAPs	✓	+2.09	+2.09

OPC is submitting this construction and operating permit application to request authorization to modify and operate the facility's CTs. Since OPC Effingham is a major source under the PSD permitting program, emission increases from the proposed project must be evaluated and compared to the significant emission rates (SERs) for regulated pollutants under the PSD program. OPC has evaluated emissions increases of carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), particulate matter (PM), total particulate matter with an aerodynamic diameter of less than 10 microns (PM<sub>10</sub>), total particulate matter with an aerodynamic diameter of less than 2.5 microns (PM<sub>2.5</sub>), greenhouse gases (GHG) in terms of carbon dioxide equivalents (CO<sub>2</sub>e), sulfur dioxide (SO<sub>2</sub>), sulfuric acid mist (H<sub>2</sub>SO<sub>4</sub>), and volatile organic compounds (VOC) resulting from the proposed project for comparison to their respective PSD SERs to determine whether PSD permitting is required, as shown in **Error! Reference source not found.**<sup>2</sup> As illustrated in Table 4, the project emissions increases do not exceed the SERs for any pollutant. Accordingly, PSD review is not required. Detailed emission calculations can be found in Appendix E of the application.

<sup>2</sup> AP-42, Chapter 3, Section 1, *Stationary Gas Turbines*, lists the lead (Pb) emission factor for natural gas turbines as ND (no detect); therefore, Pb emissions increases for the proposed project were not evaluated.

**Table 4: Project Emissions Increases**

Pollutant	Units CTG1 and CTG2				Cooling Tower Associated Emissions Increase (tpy)	Total Project Emissions Increase (tpy)	PSD Significant Emission Rate (tpy)	PSD Triggered?
	Baseline Actual Emissions (tpy)	"Could Have Accommodated" Emissions (tpy)	Projected Actual Emissions (tpy)	Project Emissions Increase <sup>1</sup> (tpy)				
NO <sub>x</sub>	82.6	103.2	140.2	<b>37.0</b>	-	<b>37.0</b>	40	No
CO	188.9	289.0	289.0	<b>0.0</b>	-	<b>0.0</b>	100	No
VOC	20.1	27.2	31.0	<b>3.80</b>	-	<b>3.8</b>	40	No
PM	50.2	68.0	77.5	<b>9.5</b>	0.8	<b>10.3</b>	25	No
PM <sub>10</sub>	50.2	68.0	77.5	<b>9.5</b>	0.6	<b>10.1</b>	15	No
PM <sub>2.5</sub>	50.2	68.0	77.5	<b>9.5</b>	1.84E-03	<b>9.5</b>	10	No
SO <sub>2</sub>	6.0	8.2	9.3	<b>1.14</b>	-	<b>1.1</b>	40	No
H <sub>2</sub> SO <sub>4</sub>	0.28	0.4	0.4	<b>0.05</b>	-	<b>0.1</b>	7	No
CO <sub>2</sub> e <sup>2</sup>	1,194,844	1,618,359	1,844,417	<b>226,058</b>	-	<b>226,058</b>	75,000	No

1. Project Emissions Increase = (Projected Actual Emissions - Baseline Actual Emissions) - ("Could Have Accommodated" Emissions - Baseline Actual Emissions)
2. For CO<sub>2</sub>e, PSD may apply only if the emissions increase exceeds the SER for CO<sub>2</sub>e and PSD is otherwise triggered by another PSD-regulated pollutant.

For purposes of calculating project emissions increases, different calculation methodologies are used for existing and new units; therefore, it is important to clarify whether the sources affected by the proposed project are considered new or existing emission units. Federal rules, 40 CFR 52.21(b)(7)(i) and (ii) define new unit and existing units and are incorporated by reference in the GRAQC.

As the emission units at OPC Effingham have operated for more than two years, the proposed project involves physical or operational changes to existing emission units only – specifically, the facility's combustion turbines. There are no new emission units proposed for installation as part of this project.

#### Baseline Actual Emissions

The most recent 5-year lookback period was utilized for this analysis. Accordingly, a period of January 2020 to December 2021 was selected as the 2-year (consecutive 24-month) baseline period for all pollutants except for CO, for which the period of March 2018 to February 2020 was selected. Baseline actual emissions data utilized for the NSR analysis for each combined cycle combustion unit can be found in Appendix E of the application.

OPC expects to begin construction of the OPC Effingham Upgrades Project on or before December 31, 2024. The selected baseline data are representative of normal operation. Because the representativeness of future (2023-2024) emissions is unknown and could be impacted by factors outside of OPC's control (e.g., fluctuations in fuel prices), the selected baseline data are approved by the Division under GRAQC 391-3-1-.02(7)(a)2.(i)(I) provided that construction of the CT Upgrades Project begins on or before December 31, 2024. Per the new Conditions in 7.14 of this permit, in

order to begin construction after December 31, 2024, OPC would first be required to update the PSD applicability test and submit such information to EPD.

Projected Actual Emissions

Projected actual emissions for the modified equipment were determined for use in the NSR analysis, based on the highest projected level of actual annual utilization of the modified combustion turbine systems in the ten years following the project (at  $31.0 \times 10^6$  MMBtu/yr total for both CCCTs), and estimated actual emission factors derived from facility operations, as summarized in

Table 5.

**Table 5. Criteria Pollutant Projected Actual Emission Factors for CCCT Units**

<b>Pollutant</b>	<b>Pollutant Emission Factor</b>
VOC <sup>3</sup>	2.00E-3
PM <sub>10</sub> / PM <sub>2.5</sub> <sup>4</sup>	5.00E-3
SO <sub>2</sub> <sup>5</sup>	6.00E-4
H <sub>2</sub> SO <sub>4</sub> <sup>6</sup>	2.76E-5
CO <sub>2</sub> <sup>7</sup>	118.6
CH <sub>4</sub> <sup>8</sup>	2.2E-3
N <sub>2</sub> O <sup>9</sup>	2.3E-4
CO <sub>2</sub> e <sup>10</sup>	118.98
NO <sub>x</sub> <sup>11</sup>	9.05E-3
CO <sup>12</sup>	2.77E-2

<sup>3</sup> VOC emission factor from the December 2000 PSD Permit Application for construction of the facility.

<sup>4</sup> PM emissions are conservatively based on the results of the compliance testing at TA Smith in 2020 (GE7FA) multiplied by a 50% safety factor and rounded up to the nearest thousandths decimal place. The test results are inclusive of both the filterable and condensable portions of PM. It was conservatively estimated that all PM is less than 2.5 microns in diameter (i.e. PM<sub>2.5</sub> = PM<sub>10</sub> = PM).

<sup>5</sup> SO<sub>2</sub> emissions were estimated using the default SO<sub>2</sub> emissions rate for pipeline natural gas from 40 CFR 75, Appendix D, Section 2.3.3.1, consistent with the methodology used to report the facility SO<sub>2</sub> emissions under the CAMD programs and the EPA GHG reporting rule.

<sup>6</sup> H<sub>2</sub>SO<sub>4</sub> emissions were calculated assuming a 3% conversion of SO<sub>2</sub> to H<sub>2</sub>SO<sub>4</sub>, consistent with the December PSD Permit Application for construction of the facility.

<sup>7</sup> CO<sub>2</sub> emissions were calculated in accordance with 40 CFR 75, Appendix G, Equation G-4 using the F-factor for natural gas, consistent with the methodology to report the facility's CO<sub>2</sub> emissions under the CAMD programs and the EPA GHG reporting rule.

<sup>8</sup> CH<sub>4</sub> and N<sub>2</sub>O emission factors for natural gas combustion are from 40 CFR 98, Subpart C, Table C-2, converted from kg to lb, consistent with the methodology to report the facility's emissions under the EPA GHG reporting rule.

<sup>9</sup> CH<sub>4</sub> and N<sub>2</sub>O emission factors for natural gas combustion are from 40 CFR 98, Subpart C, Table C-2, converted from kg to lb, consistent with the methodology to report the facility's emissions under the EPA GHG reporting rule.

<sup>10</sup> CO<sub>2</sub>e was calculated as the sum of the emission factors for each GHG pollutant multiplied by that pollutant's global warming potential (GWP). GWPs were taken from 40 CFR 98, Subpart A, Table A-1.

CO<sub>2</sub>: 1  
CH<sub>4</sub>: 25  
N<sub>2</sub>O: 298

<sup>11</sup> The average NO<sub>x</sub> and CO emission factors (lb/MMBtu) were based on the total NO<sub>x</sub> and CO emissions divided by the total heat input during the 24-month baseline for each pollutant multiplied by a 10% safety factor.

<sup>12</sup> The average NO<sub>x</sub> and CO emission factors (lb/MMBtu) were based on the total NO<sub>x</sub> and CO emissions divided by the total heat input during the 24-month baseline for each pollutant multiplied by a 10% safety factor.

### CCTT HAP Emission Factors

HAP and toxic air pollutant (TAP) emissions are evaluated from each CCCT using AP-42 based emission factors, unless otherwise noted. Details regarding the estimation of HAP/TAP emissions can be found in Appendices B and C of the application.

### Cooling Tower Emission Factors

Cooling tower emissions, as found in Appendix B of the application, are calculated based on a vendor based drift rate, and facility records of the Total Dissolved Solids (TDS) concentration present in the waters processed at the cooling tower. This data is relied upon using emission estimation methods for cooling towers outlined in *Calculating Realistic PM<sub>10</sub> Emissions from Cooling Towers* by Joel Reisman and Gordon Frisbie, 2002, to estimate potential emissions from the facility cooling towers.

### Insignificant Emission Sources

The facility has other small insignificant sources of emissions (e.g., fugitive piping leaks, roads, etc.) at the facility which are not quantified within the potential to emit estimates within the application.

### Could Have Accommodated Emissions

The “could have accommodated” emissions for this project are based on consideration of the “Georgia Pacific memo” and subsequent correspondence with U.S. EPA, indicating that a maximum 30-day period can be utilized to demonstrate emissions that “could have been accommodated” by a source during the respective baseline period.<sup>13</sup> Additional conservative assumptions were applied to the 30-day maximum period technique as outlined in the referenced Georgia Pacific memo.

Specifically, application of an additional seasonal variation was relied upon for this analysis. The maximum 30-day period from each season was evaluated and used to evaluate total emissions for the entire seasonal period. Seasonal breakdowns were evaluated as follows;

Spring: March – May  
Summer: June – August  
Fall: September – November  
Winter: December – February

---

<sup>13</sup> <https://www.epa.gov/nsr/response-georgia-pacific-use-demand-growth-exclusion-projected-actual-emissions>

The maximum monthly emissions from each season were then used to compile data for a 12-month period. Specifically, the highest monthly emissions from each season were summed together and then multiplied by three months per season to calculate the “could have accommodated” emissions for this project used in this permit application. Emissions that are excluded from the projected actual emissions using this methodology are necessarily unrelated to the proposed project as they are based on existing capacity and actual data from the selected baseline period.

Additional data regarding the “could have accommodated” analysis is included in Appendix E of the application.

#### Associated Emissions Increases

In addition to the emission increases from new or modified units, emission increases from associated emission units that may realize an increase in emissions due to a project must be included in the assessment of the project emissions increases. OPC Effingham anticipates that the modifications to and increased utilization of the combustion turbines would result in an associated increase in drift loss and, therefore, air emissions from the facility’s cooling tower. As such, associated emissions increases are included in this analysis for the cooling towers. No other facility emission units are anticipated to have any associated emissions increases related to this project.

#### Toxic Impact Analysis

A toxic impact analysis was performed and included in the application in Appendix C. The Division reviewed the analysis and agrees that the result of the analysis is that the impacts of all TAP from OPC Effingham are well below the respective annual, 24-hour, and 15-minute AACs.

### C. PSD/NSR Applicability

The facility is an existing PSD major source, as it has potential emissions of NO<sub>x</sub>, CO, and particulate matter exceeding the major source threshold of 100 tpy.<sup>14</sup> The facility was originally permitted in 2001 and was permitted as a major source under the PSD regulations.

As a result, new construction or modifications that result in emissions increases for criteria pollutants are potentially subject to PSD permitting requirements.

The federal NSR program is comprised of two elements: NNSR and PSD. The NNSR program potentially applies to new construction or modifications that result in emission increases of a particular pollutant for which the area where the facility is located is classified as “nonattainment” for that pollutant. The PSD program applies to project increases of those pollutants for which the area the facility is located in is classified as “attainment” or “unclassifiable.” OPC Effingham is located in Effingham County, which has been designated by the U.S. EPA as “attainment” or “unclassifiable” for all criteria pollutants.<sup>15</sup> Therefore, PSD is the applicable potential permitting program under the federal NSR program.

---

<sup>14</sup>Fossil fuel-fired steam electric plants of more than 250 MMBtu/hr input (which includes combined cycle natural gas plants) are on the “List of 28” named source categories which are subject to a lower major source threshold for criteria pollutants of 100 tpy.

<sup>15</sup> 40 CFR 81.311



The PSD program only regulates emissions from “major” stationary sources of regulated air pollutants. A stationary source is considered PSD major if potential emissions of any regulated pollutant exceed the major source thresholds. The PSD major source threshold for OPC Effingham is 100 tpy for all regulated pollutants, except GHG.<sup>16, 17</sup> OPC Effingham is classified as an existing PSD major source since potential emissions of at least one regulated pollutant exceeds 100 tpy. For sources which are PSD major for at least one regulated pollutant, the emissions increase for all regulated pollutants resulting from the proposed project must be compared against the PSD SER to determine if the project is subject to PSD review. For CO<sub>2</sub>e, PSD only applies if the emissions increase from the proposed project exceeds the SER for CO<sub>2</sub>e and the project is already undergoing PSD permitting for at least one other PSD-regulated pollutant.

The emissions increase from the proposed project for each regulated pollutant compared to the respective SERs are shown in the above Table 4.

As illustrated in the above Table 4, the project emissions increases do not exceed the SERs for any pollutant. Accordingly, PSD review is not required.

---

<sup>16</sup> Fossil fuel-fired steam electric plants of more than 250 MMBtu/hr input (which includes combined cycle natural gas plants) are on the “List of 28” named source categories which are subject to a lower major source threshold for criteria pollutants of 100 tpy.

<sup>17</sup> 40 CFR 52.21(b)(49)(iii)

#### IV. Regulated Equipment Requirement

##### A. Brief Process Description

OPC Effingham is proposing the CT (combustion turbine) Upgrades Project involving modifications to the facility's combustion turbines. The project would result in increases in maximum heat input and maximum projected annual air emissions.

##### B. Equipment List for the Process

Emission Units		Applicable Requirements/Standards	Air Pollution Control Devices	
ID No.	Description		ID No.	Description
AB1	Natural Gas-Fired Auxiliary Boiler with a 17 MMBtu/hr Heat Input Capacity	40 CFR 52.21 40 CFR 60 Subpart A 40 CFR 60 Subpart Dc 391-3-1-.02(2)(d) 391-3-1-.02(2)(g)	N/a	N/a
CT1	Cooling Tower 8 cells	40 CFR 52.21	DE1	Drift Eliminators
CTG1	GE 7FA Combustion Turbine, 200 MW	40 CFR 60 Subpart A 40 CFR 60 Subpart GG*** <b>40 CFR 60, Subpart KKKK**</b> 40 CFR 52.21 391-3-1-.02(2)(b) and (g) Acid Rain CSAPR	SCR1	Selective Catalytic Reduction (SCR)
CTG2	GE 7FA Combustion Turbine, 200 MW	40 CFR 60 Subpart A 40 CFR 60 Subpart GG*** <b>40 CFR 60, Subpart KKKK**</b> 40 CFR 52.21 391-3-1-.02(2)(b) and (g) Acid Rain CSAPR	SCR2	Selective Catalytic Reduction (SCR)
DWP1	Emergency Firewater Pump, 235 bhp (2.06 MMBtu/hr)	40 CFR 52.21 391-3-1-.02(2)(b) and (g) 40 CFR 63, Subpart A 40 CFR 63, Subpart ZZZZ	N/a	N/a
FP1	Natural Gas-fired Preheater with a 1.875 MMBtu/hr Heat Input Capacity	40 CFR 52.21 391-3-1-.02(2)(d) 391-3-1-.02(2)(g)	N/a	N/a
HRSG1	Heat Recovery Steam Generator (no duct firing)	40 CFR 52.21 <b>40 CFR 60, Subpart KKKK**</b>	N/a	N/a
HRSG2	Heat Recovery Steam Generator (no duct firing)	40 CFR 52.21 <b>40 CFR 60, Subpart KKKK**</b>	N/a	N/a
STG1	Steam Turbine Generator, 155 MW	40 CFR 52.21	N/a	N/a

\* Generally applicable requirements contained in this permit may also apply to emission units listed above. The lists of applicable requirements/standards are intended as a compliance tool and may not be definitive.

\*\* Reflects the regulatory applicability for the Combustion Turbines (CTG1, CTG2) following the completion of the Advanced Gas Path (AGP) Upgrade Project.

\*\*\* Reflects the regulatory applicability for the Combustion Turbines (CTG1, CTG2) prior to the completion of the Advanced Gas Path (AGP) Upgrade Project.

## C. Equipment & Rule Applicability

### Combustion Turbines CTG1 and CTG2

#### **Federal Rule Standards**

#### NSPS (New Source Performance Standards)

#### 40 CFR 60 Subpart GG - “Standards of Performance for Stationary Gas Turbines”

Presently, the combustion turbines at OPC Effingham are subject to NSPS Subpart GG. However, upon completion of the proposed modifications, the combustion turbine systems will be subject to the more recently promulgated standards for Stationary Combustion Turbines under NSPS Subpart KKKK. Pursuant to 40 CFR 60.4305(b) (NSPS Subpart KKKK), stationary combustion turbines regulated under NSPS Subpart KKKK are exempt from the requirements of NSPS Subpart GG. Therefore, NSPS Subpart GG will no longer apply to the facility’s combustion turbines following the proposed project.

#### 40 CFR 60 Subpart KKKK – Stationary Combustion Turbines

NSPS Subpart KKKK, *Standards of Performance for Stationary Combustion Turbines*, applies to all stationary combustion turbines with a heat input at peak load equal to or greater than 10 MMBtu/hr, based on the lower heating value of the fuel fired, and were constructed, reconstructed, or modified after February 18, 2005.<sup>18</sup> OPC Effingham consists of two natural gas-fired combustion turbines, each of which was constructed prior to 2005 and has a heat input capacity exceeding 10 MMBtu/hr. To determine if the turbines will be subject to NSPS Subpart KKKK following the proposed project, it is necessary to ascertain if a “modification” per the NSPS has occurred. For purposes of NSPS, a modification is defined as:<sup>19</sup>

*...any physical change in, or change in the method of operation of, an existing facility which increases the amount of any air pollutant (to which a standard applies) emitted into the atmosphere by that facility or which results in the emission of any air pollutant (to which a standard applies) into the atmosphere not previously emitted.*

More specifically, for an existing electric utility steam generating unit:<sup>20</sup>

*No physical change, or change in the method of operation, at an existing electric utility steam generating unit shall be treated as a modification...provided that such change does not increase the maximum hourly emissions of any pollutant regulated under this section above the maximum hourly emissions achievable at that unit during the 5 years prior to the change.*

---

<sup>18</sup> 40 CFR 60.4305(a), (b)

<sup>19</sup> 40 CFR 60.2

<sup>20</sup> 40 CFR 60.14(h)

The Advanced Gas Path (AGP) Upgrade will result in an increase in the hourly heat input capacity for the combustion turbines. On this basis, OPC has conservatively presumed that an increase in the amount of an air pollutant regulated by NSPS Subpart KKKK could occur on a short-term (hourly) basis.

Therefore, once the proposed modifications are complete, the OPC Effingham combustion turbines will be subject to NSPS Subpart KKKK. Pursuant to 40 CFR 60.4305(a), the associated HRSGs will also be subject to NSPS Subpart KKKK.

Per 40 CFR 60.4305(b), stationary combustion turbines regulated under NSPS Subpart KKKK are exempt from the requirements of NSPS Subpart GG. HRSGs regulated under NSPS Subpart KKKK are also exempt from the requirements of NSPS Subparts Da, Db, and Dc.

#### Emission Limits

Per Table 1 to NSPS Subpart KKKK, a modified combustion turbine is subject to NO<sub>x</sub> emission limits depending on the type of fuel combusted and the heat input at peak load. For modified combustion turbines firing natural gas with a rating greater than 850 MMBtu/hr, the NO<sub>x</sub> emission standard is 15 ppm at 15% O<sub>2</sub> or 0.43 lb/MWh useful output. NSPS Subpart KKKK also includes, for units greater than 30 MW output, a NO<sub>x</sub> limit of 96 ppm at 15% O<sub>2</sub> or 4.7 lb/MWh useful output for turbine operation at ambient temperatures less than 0 °F and turbine operation at loads less than 75% of peak load.<sup>21</sup> Compliance with the NO<sub>x</sub> emission limit is determined on a 30 unit operating day rolling average basis.<sup>22</sup> As the combustion turbines are presently subject to a NO<sub>x</sub> limitation of 3.0 ppm at 15% O<sub>2</sub>, 3-hour average per Condition 3.3.4.a of the existing Title V operating permit, the new NSPS Subpart KKKK NO<sub>x</sub> limitations will be subsumed by the facility's NO<sub>x</sub> BACT limitation.

SO<sub>2</sub> emissions from combustion turbines located in the continental U.S. are limited to 0.9 lb/MWh gross output (or 110 ng/J), or the units must not burn any fuel with total potential sulfur emissions in excess of 0.060 lb SO<sub>2</sub>/MMBtu heat input.<sup>23</sup>

#### Monitoring and Testing Requirements

Pursuant to 40 CFR 60.4333(a), the combustion turbines, air pollution control equipment, and monitoring equipment will be maintained in a manner that is consistent with good air pollution control practices for minimizing emissions. This requirement applies at all times including during startup, shutdown, and malfunction.

---

<sup>21</sup> Table 1 to Subpart KKKK of Part 60

<sup>22</sup> 40 CFR 60.4350(h), 40 CFR 60.4380(b)(1)

<sup>23</sup> 40 CFR 60.4330(a)(1) or (a)(2), respectively

### NO<sub>x</sub> Compliance Demonstration Requirements

The combustion turbine systems presently employ a continuous emission monitoring system (CEMS) for NO<sub>x</sub> per the requirements of the Acid Rain Program (ARP), promulgated in 40 CFR Part 75. Pursuant to 40 CFR 60.4340(b)(1) and 40 CFR 60.4345, OPC Effingham can rely on its existing NO<sub>x</sub> CEMS installed and certified according to 40 CFR Part 75 Appendix A to demonstrate ongoing compliance with the NSPS Subpart KKKK NO<sub>x</sub> emission limits. Sources demonstrating compliance with the NO<sub>x</sub> emission limit via CEMS are not subject to the requirement to perform initial and annual NO<sub>x</sub> stack tests.<sup>24</sup> Initial compliance with the NO<sub>x</sub> emission limit will be demonstrated by comparing the arithmetic average of the NO<sub>x</sub> emissions measurements taken during the initial relative accuracy test audit (RATA) required pursuant to 40 CFR 60.4405 to the NO<sub>x</sub> emission limit under this subpart.<sup>25</sup> NO<sub>x</sub> emissions must be measured after the duct burner rather than directly after the turbine.

### SO<sub>2</sub> Compliance Demonstration Requirements

For compliance with the SO<sub>2</sub> emission limit, facilities are required to perform regular determinations of the total sulfur content of the combustion fuel and to conduct initial and annual compliance demonstrations. The total sulfur content of gaseous fuel combusted in the combustion turbine must be determined and recorded once per operating day or using a custom schedule as approved by the Division;<sup>26</sup> however, OPC Effingham elects to opt out of this provision of the rule by using a fuel that is demonstrated not to exceed potential sulfur emissions of 0.060 lb/MMBtu SO<sub>2</sub>.<sup>27</sup> This demonstration can be made using one of the following methods:

- By using a purchase contract specifying that the fuel sulfur content for the natural gas is less than or equal to 20 grains of sulfur per 100 standard cubic feet and results in potential emissions not exceeding 0.060 lb/MMBtu; or
- By using representative fuel sampling data meeting the requirements of 40 CFR 75, Appendix D, Sections 2.3.1.4 or 2.3.2.4 which show that the sulfur content of the fuel does not exceed 0.060 lb SO<sub>2</sub>/MMBtu heat input.

OPC Effingham is currently required to monitor the sulfur content of the natural gas burned in the combustion turbines and duct burners through submittal of a semiannual analysis of the gas by the supplier or the facility to demonstrate that the sulfur content does not exceed its permit-provided excursion threshold of 2.5 grains per 100 standard cubic feet.<sup>28</sup> This sulfur content analysis by the supplier or OPC Effingham satisfies the sulfur content demonstration requirement of 40 CFR 60.4365. Therefore, continued compliance with this existing permit condition will guarantee compliance with the NSPS Subpart KKKK sulfur monitoring requirement.

---

<sup>24</sup> 40 CFR 60.4340(b), 40 CFR 60.4405

<sup>25</sup> 40 CFR 60.4405(c)

<sup>26</sup> 40 CFR 60.4370(b) and (c)

<sup>27</sup> 40 CFR 60.4365

<sup>28</sup> Permit No. 4911-103-0012-V-05-0, Conditions 5.2.3, 6.1.7.c.i.

### Initial Notification

Per 40 CFR 60.7(a)(4), Permit Application No. TV-668257 serves as the required notification for any physical or operational change to an existing facility which qualifies as an NSPS modification.

### 40 CFR 60 Subpart TTTT – Greenhouse Gas Emissions for Electric Generating Units

NSPS Subpart TTTT, *Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units*, applies to any fossil fuel fired steam generating unit, Integrated Gasification Combined Cycle (IGCC) unit, or stationary combustion turbine constructed after January 8, 2014 or reconstructed after June 18, 2014, and to any steam generating unit or IGCC modified after June 18, 2014, provided that unit has a base load rating greater than 250 MMBtu/hr and serves a generator capable of selling greater than 25 MW of electricity to the grid.<sup>29</sup> The existing CCCT generating units for OPC Effingham each have peak heat inputs greater than 250 MMBtu/hr and serve a generator greater than 25 MW. Therefore, the CCCT generating units could potentially be subject to the provisions of NSPS TTTT.

With respect to stationary combustion turbines, NSPS Subpart TTTT applies only to units that commenced construction or reconstruction after the specified dates, not modification. “Reconstruction” is defined under 40 CFR 60 Subpart A as the replacement of components of an existing affected facility such that the fixed capital cost of the new components exceeds 50% of the fixed capital cost that would be required to construct a comparable, entirely new affected facility that is technologically and economically capable of complying with the applicable standards.<sup>30</sup> The total cost of the AGP and LLTD Upgrades is well under 50% of the cost for two comparable new units. As the combustion turbines at OPC Effingham are existing units and the proposed project does not meet the reconstruction definition, the modifications to the turbine systems will not trigger applicability of NSPS Subpart TTTT requirements.<sup>31</sup>

### Non-Applicability of all other NSPS

NSPS are developed for particular industrial source categories. The applicability of a particular NSPS to the proposed project can be readily ascertained based on the industrial source category covered. All other NSPS, besides Subpart A, are categorically not applicable to the proposed project.

### NESHAP (National Emission Standards for Hazardous Air Pollutants)

NESHAP, located in 40 CFR 61 and 40 CFR 63, have been promulgated for source categories that emit HAP to the atmosphere. A facility that is a major source of HAP is defined as having potential emissions of greater than 25 tpy of total HAP and/or 10 tpy of individual HAP. Facilities with a potential to emit HAP at an amount less than that which is defined as a major source are otherwise considered an area source. Under 40 CFR 63, the NESHAP allowable emissions limits are most often established on the basis of a maximum achievable control technology (MACT) determination for the particular major source. These NESHAP apply to sources in specifically regulated industrial

---

<sup>29</sup> 40 CFR 60.5509(a)

<sup>30</sup> 40 CFR 60.15

<sup>31</sup> 40 CFR 60.5509(a)

source categories (Clean Air Act Section 112(d)) or on a case-by-case basis (Section 112(g)) for facilities not regulated as a specific industrial source type.

The following NESHAP could potentially apply to the Effingham facility:

- ▶ Industrial, Commercial, and Institutional Boilers and Process Heaters (at Area Sources), NESHAP Subpart JJJJJ
- ▶ Stationary Reciprocating Internal Combustion Engines (at Major and Area Sources), NESHAP Subpart ZZZZ

As demonstrated in Appendix B of the application, the Effingham facility is a minor, or area, source of HAPs since total HAP emissions are below 25 tpy and maximum individual HAP emissions are less than 10 tpy. Therefore, the facility is only potentially subject to NESHAP Subparts JJJJJ and ZZZZ. However, NESHAP Subpart JJJJJ does not apply to the facility because the combustion turbines do not meet the definition of a boiler<sup>32</sup>. Furthermore, the natural gas-fired auxiliary boiler and process heater are not subject to NESHAP Subpart JJJJJ because neither natural gas-fired boilers nor process heaters are subject to this subpart.<sup>33</sup>

NESHAP Subpart ZZZZ does apply to the Emergency Firewater Pump as an existing unit at an area source of HAP. The engine will not be modified as part of the proposed project, and the applicable requirements for the unit will not be impacted as a result of the project.

#### Initial Notification

No initial notification is necessary for any existing stationary combustion turbine, even if a new or reconstructed turbine in the same category would require an initial notification.

#### 40 CFR 64, Compliance Assurance Monitoring (CAM)

Under 40 CFR 64, Compliance Assurance Monitoring (CAM), facilities are required to prepare and submit monitoring plans for certain emissions units as part of Title V operating permit applications. The CAM plans are intended to provide an on-going and reasonable assurance of compliance with emission limits for units equipped with air pollution control devices. Pursuant to 40 CFR 64.2(b)(1)(vi), emission limits for which a Part 70 Permit specifies a continuous compliance determination method are exempt from CAM requirements. Since Condition 5.2.1 of the facility's permit requires the operation of a NO<sub>x</sub> and CO CEMS for both CCCT stacks, the Division has previously determined that the emission units are exempt from CAM. Therefore, no CAM documentation was included with the permit application.

The combustion turbines (ID Nos. CTG1 and CTG2) are controlled by the selective catalytic reduction (SCR) to control NO<sub>x</sub> emissions in order to comply with the NO<sub>x</sub> BACT limit.

---

<sup>32</sup> 40 CFR 63.11237

<sup>33</sup> 40 CFR §63.11195(e)

### Acid Rain Program (ARP)

**Applicability:** The Acid Rain Regulations apply to the CT/HRSG system because it has a nameplate capacity greater than 25MW<sub>e</sub> and it is to supply electricity for sale, whether wholesale or retail.

This facility is subject to requirements in Title IV of the 1990 Clean Air Act Amendment (CAAA). The CT/HRSG system is subject to 40 CFR 72 (permits), 73 (sulfur dioxide), and 75 (monitoring). It is not subject to the nitrogen oxide provisions (40 CFR 76) of the Acid Rain regulations because it does not have the capability to burn coal.

**Emission Standard:** No SO<sub>2</sub> allowances are allocated up front to the facility, by the Acid Rain Regulations. As such, OPC will need to acquire SO<sub>2</sub> allowances in amounts equal to their annual SO<sub>2</sub> tonnage.

NO<sub>x</sub> emissions are not limited by the Acid Rain Regulation since the units are not classified as coal-fired utility boilers.

Under 40 CFR 75 of the ARP, OPC Effingham is required to operate a NO<sub>x</sub> CEMS for each unit to monitor the NO<sub>x</sub> emission rate (lb/MMBtu) and to determine SO<sub>2</sub> and CO<sub>2</sub> mass emissions (tons) following the procedures in Appendices D and G, respectively. Further, the ARP requires the facility to possess SO<sub>2</sub> allowances for each ton of SO<sub>2</sub> emitted. The ARP also requires initial certification of required monitoring systems within 90 days of commencement of commercial operation and the submittal of quarterly reports and an annual compliance certification. The ARP requirements are outlined in Section 7.9 and Attachment D of the Title V Permit No. 4911-103-0012-V-06-0. The proposed project will not alter any applicable requirements or compliance options of the ARP to the OPC Effingham operations. The facility will continue to maintain sufficient allowances under ARP for its operations.

### Cross-State Air Pollution Rule (CSAPR)

The CAIR, 40 CFR 96, called for reductions in SO<sub>2</sub> and NO<sub>x</sub> emissions by utilizing an emissions trading program. More broadly, 40 CFR 96 also includes a forerunner to CAIR, the NO<sub>x</sub> SIP Call / NO<sub>x</sub> Budget program, and the name of 40 CFR 96 (NO<sub>x</sub> Budget Trading Program for State Implementation Plans) still reflects the origins in regulating only NO<sub>x</sub>.

The CSAPR was developed to require affected states to reduce emissions from power plants that contribute to ozone and/or particulate matter emissions. Following legal challenges, CSAPR replaced CAIR and began Phase 1 implementation on January 1, 2015 for annual programs and May 1, 2015 for the ozone season program. Phase 2 implementation began on January 1, 2017 for annual programs and May 1, 2017 for ozone season programs.

Therefore, since CSAPR is currently effective, potential applicability is evaluated against the CSAPR Program and not CAIR. CSAPR applicability is found in 40 CFR 97.404 and definitions in 40 CFR 97.402 and implemented via Georgia EPD through GRAQC 391-3-1-.02(12) – (13). Georgia is subject to CSAPR programs for both fine particles (SO<sub>2</sub> and annual NO<sub>x</sub>) and ozone (ozone season NO<sub>x</sub>).



The CSAPR applicability is similar but distinct from the ARP, with applicability criteria and definitions per 40 CFR 97.402. In general, CSAPR regulates fossil-fuel-fired boilers and combustion turbines serving on any day starting November 15, 1990 or later, an electrical generator with a nameplate capacity exceeding 25 MWe and producing power for sale. OPC Effingham's CCCTs are affected sources under this regulation, and the proposed project will not alter any applicable requirements or compliance options of CSAPR to the facility's operations. OPC Effingham will continue to maintain sufficient allowances under CSAPR for its operations.

### **GA State Rule Standards**

#### Combustion Turbines CTG1 and CTG2

The combustion turbines are subject to the visible emission limit (40 percent opacity) specified in Georgia Air Quality Control Rule 391-3-1-.02(2)(b) "Visible Emissions," and the fuel sulfur content limit specified in Georgia Air Quality Control Rule 391-3-1-.02(2)(g) "Sulfur Dioxide." Note that the GA Rule (b) visible emission limit is subsumed by the PM BACT limit (10 percent opacity), while the GA Rule (g) fuel sulfur content limit is subsumed by the fuel requirement specified in Conditions 3.3.2 and 3.3.10. Since the turbines fire exclusively on natural gas, and natural gas is considered a clean fuel, compliance with both GA Rule (b) and (g) limits is expected.

#### **D. Modified and New Permit Conditions**

Condition 3.3.1 subjects the combustion turbines (ID Nos. CTG1 and CTG2) to 40 CFR 60 Subpart A and Subpart GG. This condition will be replaced with New Condition 3.3.17 following completion of the Advanced Gas Path (AGP) Upgrade project.

Condition 3.3.2 limits the combustion turbines to fire only natural gas. Subpart KKKK citation added.

Condition 3.3.10 includes the NSPS Subpart GG fuel sulfur content limit. This condition will be replaced with New Condition 3.3.18 following completion of the Advanced Gas Path (AGP) project.

New Condition 3.3.17 subjects the combustion turbines (ID Nos. CTG1 and CTG2) to 40 CFR 60 Subpart A and Subpart KKKK. This condition will become applicable following completion of the Advanced Gas Path (AGP) Upgrade project.

New Condition 3.3.18 includes the NSPS Subpart KKKK fuel sulfur content limit. This condition will become applicable following completion of the Advanced Gas Path (AGP) Upgrade project.

New Condition 3.3.19 includes the NSPS Subpart KKKK NO<sub>x</sub> limits. This condition will become applicable following completion of the Advanced Gas Path (AGP) project.

**V. Testing Requirements (with Associated Record Keeping and Reporting)**

Condition 4.1.3g. updated Method 5 and/or 201A.

Condition 4.2.1 state the initial testing requirements for PM emissions.

Condition 4.2.2 state the initial testing requirements for NOx emissions.

**VI. Monitoring Requirements (with Associated Record Keeping and Reporting)**

Condition 5.2.1 Subpart GG and Subpart KKKK citation added.

Condition 5.2.3 was modified to add a citation for 40 CFR 60 Subpart KKKK.

New Condition 5.2.8 was added to include the requirements of 40 CFR 60 Subpart KKKK following completion of the Advanced Gas Path (AGP) Upgrade project.

## **VII. Other Record Keeping and Reporting Requirements**

Condition 6.1.7a.i. was modified to no longer apply following completion of the Advanced Gas Path (AGP) Upgrade project, since the requirements of 40 CFR 60 Subpart GG will no longer be applicable.

New Conditions 6.1.7a.ii. and 6.1.7a.iii. were added to state excess emissions as defined in 40 CFR 60 Subpart KKKK following completion of the Advanced Gas Path (AGP) Upgrade project.

Condition 6.1.7b.i. was modified to include the references to Part 52.

Condition 6.2.12 was modified to no longer apply following completion of the Advanced Gas Path (AGP) Upgrade project, since the requirements of 40 CFR 60 Subpart GG will no longer be applicable.

Condition 6.2.13 was modified to no longer apply following completion of the Advanced Gas Path (AGP) Upgrade project, since the requirements of 40 CFR 60 Subpart GG will no longer be applicable.

New Condition Nos. 6.2.17, 6.2.18, and 6.2.19 require that the facility calculate and report their total actual emissions for the 10 years following the combustion turbine upgrade projects to show compliance with the actual to predicted-actual emissions calculations that demonstrate NSR non-applicability (recordkeeping requirements from GA Rule 391-3-1-.02(7)(b)15.(i)(III) and (V)). They are requested to report the unit's annual emissions of any regulated NSR pollutant from the facility that could increase as a result of the modifications, from each combined combustion turbine during the calendar year.

New Condition 6.2.20 contains the notification requirements of the return of combustion turbines CTG1 and CTG2 to normal operations after completion of the Advanced Gas Path (AGP) Upgrade project or the Low Load Turndown (LLTD) project.

New Condition No. 7.14.1 contains the NSR recordkeeping requirements of GA Rule 391-3-1-.02(7)(b)15.(i)(I). Per New Condition 7.14.2, OPC must update these records and provide a copy to EPD if construction of the CT Upgrades Project does not commence on the expected schedule of on or before December 31, 2024.

## **VIII. Specific Requirements**

### **A. Operational Flexibility**

There are no requests for operational flexibility associated with this modification.

### **B. Alternative Requirements**

There are no alternative requirements associated with this modification.

### **C. Insignificant Activities**

There are no insignificant activities associated with this modification.

### **D. Temporary Sources**

There are no temporary sources associated with this modification.

### **E. Short-Term Activities**

There are no short-term activities associated with this modification.

### **F. Compliance Schedule/Progress Reports**

The company did not indicate any noncompliance issues in its application.

### **G. Emissions Trading**

There are no emissions trading associated with this modification.

### **H. Acid Rain Requirements/CAIR/CSPAR**

This permit modification does not affect the applicability of Acid Rain or CAIR/CSPAR requirements to this facility.

### **I. Prevention of Accidental Releases**

This permit modification does not affect the applicability of Prevention of Accidental Releases requirements to this facility.

### **J. Stratospheric Ozone Protection Requirements**

This permit modification does not affect the applicability of Stratospheric Ozone Protection requirements to this facility.

K. Pollution Prevention

This permit modification does not affect the applicability of Pollution Prevention requirements to this facility.

L. Specific Conditions

Permit Condition 7.14.1 and 7.14.2 are added to include the recordkeeping requirements from GA Rule 391-3-1-.02(7)(b)15.(i)(I) and (II).

**Addendum to Narrative**

The 30-day public review started on month day, year and ended on month day, year. Comments were/were not received by the Division.

//If comments were received, state the commenter, the date the comments were received in the above paragraph. All explanations of any changes should be addressed below.//